

Title: UNIVERSAL VACUUM FILTER CARTRIDGE

I. BACKGROUND OF THE INVENTION

A. FIELD OF THE INVENTION

[0001] The invention generally relates to a replaceable,
5 high efficiency vacuum filter cartridge which is designed to
function in many brands of portable vacuum cleaning machines.

B. Description of Prior Art

[0002] Portable vacuum cleaners are used within homes,
industry and medical facilities among others. There are many
10 manufacturers of portable vacuum cleaning machines, each with
their own replaceable filter cartridge. This requires a site
using several brands of vacuum cleaning machines to also
stockpile many replacement filter cartridges. There exists a
need for a more universal filter cartridge which would fit
15 conveniently into many brands of vacuum cleaning machines.

[0003] This invention resolves the need for universality of
vacuum filter cartridges by designing a cartridge specifically
to fit into many machines while maintaining High Efficiency
Particulate Air (HEPA) filtration and Ultra-Low Penetration Air
20 (ULPA) quality.

II. SUMMARY OF THE INVENTION

[0004] More specifically, this invention relates to a vacuum
cleaner filter cartridge having primary, secondary and tertiary
filters, and to an improved filter cartridge holding said
25 filter set which is designed for use in many vacuum cleaning
machines.

[0005] This invention provides a replaceable vacuum filter cartridge with dimensions allowing universality of use in many vacuum cleaning machines. Said cartridge provides very high efficiency removal of fine particulates from 0.3 microns to
5 0.12 micron air filtration. The cartridge fits in at least three different brands of vacuum cleaning machines and as many as 10 brands.

[0006] The filter cartridge described can be built of with several options of filter efficiencies from Standard (0.5
10 micron), HEPA (99.97% efficient at 0.5 micron) and ULPA (99.999% efficient at 0.12 micron) filtration.

III. DRAWINGS

A. BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Figure 1 illustrates the perspective view of the
15 invention cartridge.

[0008] Figure 2 illustrates the invention cartridge in frontal view.

[0009] Figure 3 illustrates the invention cartridge in longitudinal cross section.

20 [0010] Figure 4 illustrates the invention cartridge in lateral cross section.

B. DETAILED DESCRIPTION OF THE DRAWINGS

[0011] Figure 3 and Figure 4 illustrates the invention cartridge in design detail. The air to be cleaned is drawn
25 into the inlet (1) by a vacuum at the outlet (2) and collects within the outer chamber (8) of the cartridge body shell (12).

The air then passes through a fan-folded filter media set (5) comprising of from one to five layers of filter material. After passing through the folded filter (5), the air collects in a central channel (9) running parallel to the length of the cartridge body (12). The cartridge body (12) is composed of two sections; The inlet section (3) and the outlet section (4). The fan-folded filter (5) is secured and sealed to both of the cartridge body segments at (6) and (7) using adhesives or hot-melt technology. The segments are sealed together using any one of many adhesion methods at (13) including adhesive tape, adhesives, hot-melt adhesives or ultrasonic welding.

[0012] Figure 4 illustrates the outside shape of the two segments of the cartridge body (12). Adjacent longitudinal radii (11) and adjacent longitudinal radii (10) are critical dimensions as well as the three spatial dimensions: outside length (14) in Figure 3 and outside width dimension (15) and (16) in Figure 4. The body segments which receive the fan-fold filter are also critical dimension: the inlet end (17) and the outlet end (18) in Figure 3. All critical dimensions are also listed in Table I below.

IV. DESCRIPTION OF THE PREFERRED EMBODIMENT

[0013] The vacuum cleaner filter cartridge referred to in Figure 1 and shown in detail in Figures 3 and 4 are manufactured with precise outside dimensions. The air outlet (2) corresponds to the vacuum source of the vacuum cleaning machine. The outside dimensions and shape allows for universality of fit within the body of at least three manufacture's machines selected from the group:

A) Atrix International, Inc.: Omega, Omega Supreme, UltiVac, UltiVac DLX, Menda Vac

B) The 3M Corporation: service vacuum cleaner models 497AJ, 497AB, 497AJH, 497ABD, 497AJK, 497AJM

5 C) Laservac, an Eltrex Company: The Shark 9000 series II

[0014] Referring to Figure 2, figure 3 and Table I; The Length (14) is from 11.67 inches (296.4 mm) plus 0.125 inches (3.175 mm) and minus 0.5 inches (12.7 mm). The diameters (15) and (16) 5.57 inches (141.5 mm) plus 0.125 inches (3.175 mm) and minus 0.5 inches (12.7 mm). The inlet (1) ID is 1.21 inches plus or minus 0.05 inches (1.3 mm). The outlet ID is 1.90 inches (30.7 mm) plus or minus 0.05 inches (1.3 mm).

[0015] Referring to Figure 4, the radius (11) is preferably 0.45 inches (11.4 mm) plus or minus 0.05 inches (1.3 mm). Radius (10) is preferably 0.1 inches (2.54 mm) plus or minus 0.025 inches (0.6 mm).

[0016] Referring to Figure 3 and 4, the preferred embodiment includes at least a single ply filter media in the fan-folded filter (5) and at least 25 pleats and as many as 55 pleats. The depth of each pleat is at least .75 inch (19.05 mm) and can be as much as 1.75 inches (44.5 mm). Said filter has at least a 0.5 micron filter media, HEPA (0.3 micron), or ULPA (0.12 micron) filtration efficiency.

[0017] **TABLE I.**

Item	Reference #	Dimension, Inches	Plus inches	Minus inches
Inlet	1	1.21	0.05	0.05
Outlet	2	1.90	0.05	0.05
Radius 10	10	0.10	0.025	0.025
Radius 11	11	0.45	0.05	0.05
Length	14	11.67	0.125	0.5
Width 15	15	5.57	0.125	0.5
Width 16	16	5.57	0.125	0.5
Inlet end	17	4.45	0.125	0.5
Outlet end	18	4.45	0.125	0.5